

CLAIMS

1. A high pressure fuel injection pipe in which pipe extension and heat treatment are repeated by using a header manufactured by transformation induced plastic type strength steel, and processing for depositing residual austenite is then performed and final pipe extension processing is performed, and internal pressure and bending fatigue strength are raised by molding a joint portion and performing bending processing without performing perfect annealing at the size of a product.

2. The high pressure fuel injection pipe according to claim 1, wherein the transformation induced plastic type strength steel is ferrite (α_f) + bainite (α_b) + γ_R composite texture steel [TRIP type Dual-Phase steel, TDP steel], and bainitic ferrite (α_{bf}) + γ_R steel [TRIP type bainite steel, TB steel] in which press molding property is greatly improved by utilizing strain induced transformation (TRIP) of the residual austenite (γ_R).

3. A high pressure fuel injection pipe in which pipe extension and heat treatment are repeated by using a header manufactured by transformation induced plastic type strength steel, and the header is finished at a product size via a final pipe extension process, and processing for depositing residual austenite is then performed, and a joint portion is molded and bending processing is performed, and the inner surface layer

of a manufactured pipe body is plastically processed so that a martensitic transformation is induced and high strength is set.

4. The high pressure fuel injection pipe according to claim 3, wherein the transformation induced plastic type strength steel is ferrite (α_f) + bainite (α_b) + γ_R composite texture steel [TRIP type Dual-Phase steel, TDP steel], and bainitic ferrite (α_{bf}) + γ_R steel [TRIP type bainite steel, TB steel] in which press molding property is greatly improved by utilizing strain induced transformation (TRIP) of the residual austenite (γ_R).

5. The high pressure fuel injection pipe according to claim 3, wherein only the inner circumferential surface is plastically deformed (autofrettage-processed) by applying internal pressure in the plastic processing.

6. A high pressure fuel injection pipe in which flaw removal processing on the inner surface of a steel pipe having a transformation induced plastic type strength steel component and pipe extension processing are performed, and the steel pipe is finished at a predetermined desirable size and is then heated to 950°C and is set to an austenite single layer and is then suddenly cooled, and austemper processing is performed at 350 to 500°C, and the inner surface is smoothed after the cooling, and a joint portion is then molded and bending processing is performed so that internal pressure and bending fatigue strength

are raised.

7. The high pressure fuel injection pipe according to claim 6, wherein the transformation induced plastic type strength steel is ferrite (α_f) + bainite (α_b) + γ_R composite texture steel [TRIP type Dual-Phase steel, TDP steel], and bainitic ferrite (α_{bf}) + γ_R steel [TRIP type bainite steel, TB steel] in which press molding property is greatly improved by utilizing strain induced transformation (TRIP) of the residual austenite (γ_R).

8. The high pressure fuel injection pipe according to claim 6, wherein cleaning processing of the inner surface is performed at least once after the smoothing of the inner surface, the molding of the joint portion, or the bending processing.

9. A high pressure fuel injection pipe in which flaw removal processing on the inner surface of a steel pipe having a transformation induced plastic type strength steel component and pipe extension processing are performed, and the steel pipe is finished at a predetermined desirable size and is then heated to 950°C and is set to an austenite single layer and is then suddenly cooled, and austemper processing is performed at 350 to 500°C, and the inner surface is smoothed after the cooling, and a joint portion is then molded and bending processing is performed, and plastic processing is further performed after said bending processing so that a martensitic transformation is induced and high strength is set.

10. The high pressure fuel injection pipe according to claim 9, wherein the transformation induced plastic type strength steel is ferrite (α_f) + bainite (α_b) + γ_R composite texture steel [TRIP type Dual-Phase steel, TDP steel], and bainitic ferrite (α_{bf}) + γ_R steel [TRIP type bainite steel, TB steel] in which press molding property is greatly improved by utilizing strain induced transformation (TRIP) of the residual austenite (γ_R).

11. The high pressure fuel injection pipe according to claim 9, wherein only the inner circumferential surface is plastically deformed (autofrettage-processed) by applying internal pressure in the plastic processing.

12. The high pressure fuel injection pipe according to claim 9, wherein cleaning processing of the inner surface is performed at least once after the smoothing of the inner surface, the molding of the joint portion, or the bending processing.